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AUTHOR Rosentswieg, Joel
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ABSTRACT

When attempts are made to utilize the procedures generally accepted in evaluation to look at something as vague as the term "exercise", confusion becomes compounded exponentially. It is important that the fundamental elements of movement, the laws of motion, and the basic movement of skills be taught to everyone. If there is a need to know what has been learned over a period of time, an initial test given at the beginning of the instructional period can be compared with similar tests given at another period. What you want to measure must be carefully defined so that valid, reliable, and objective measures may be taken. Pre-testing, after assuring that procedure and basic skills of every test are learned, provides a criterion measure. A well-designed activity program that includes time for formative evaluation to take place is necessary to continue motivation and improvement. If the teacher is doing a good job teaching, it is rewarding to see the students enthusiastically recognize their abilities by noting that they are performing above the average on standarized tests. It is a simple task to find an instrument that purports to measure whatever facet you have decided upon as your goal. To realize the potential of evaluation to determine the effects of exercise involves considerable effort on the part of the teacher, particularly in terms of planning before the actual need to evaluate begins. (SK)

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Evaluating the Effects Of Exercise

Joel Rosentswieg
Texas Woman's University

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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The term "exercise" includes a multitude of sins. Our profession has varied in the use of that term from a strict interpretation of calisthenics to activities involving minimal movement. The term evaluation connotes value. As values depend upon the subjectivity of the evaluator there exists a bias in every evaluation. When we attempt to utilize the procedures generally accepted in evaluation to look at something as vague as the term "exercise", the confusion becomes compounded exponentially.

Furthermore, the literature is not very helpful when the subjects of interest in relation to exercise are public school-age children. The elementary school-age child is the least studied of all groups when it comes to the careful investigation of the effects of exercise. Many authorities have reported that children of this age spend much more time in play activities out of school than they possibly could in school. This factor obviously limits our use of data that has not considered this problem. Most of the investigations of the younger child have been descriptive, telling us what exists in nature, rather than experimental, which can aid us in making inferences, and this further limits the value of most studies in making interpretations about exercise effects. To add insult to injury, few physical education investigators use samples that are truly representative of anything but themselves. Sheppard (1973) notes the biased sampling that has been used in the measure that received the greatest amount of study, aerobic fitness.

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Let me clearly state that as teachers we must constantly remember that our ultimate goal is to be sure that our product, the students, are educated in the best sense of that word. We must not confuse education with sports, game, or dance. Our chauvinism shows very easily. Yet, as physical educators we must not forget that our unique media is gross movement and that as we attempt to educate people the role of human motion is not ignored. It is interesting to note that more people than ever before are actively involved in recreational pursuits involving physical activity, yet unfortunately, most of these people participate in activities that we do not teach in physical education to satisfy objectives that we regulate to a secondary position in most educational programs.

The experts in learning have stated that learning is specific and that as we provide the opportunities to learn to move in a sequentially planned program the end points of that learning, our goals, need to be recognized and specified. With an even greater emphasis than ever before upon letting the individual select those activities that are personally satisfying, it becomes important that the fundamental elements of movement, the laws of motion and the basic movement skills, be taught to everyone. Some physical educators apparently are not able to identify the factors that are the foundation of our discipline and thus cannot be expected to set program goals that can be appropriately evaluated and still allow for individualism.

Keogh (1973) notes that children come to school with a reportoire of skills and as they grow, changes in movement becomes more difficult to discern. This is especially true when the skills taught and tested are specific and related to games, sports, and dances that are not

necessarily those the children desire to learn. Keogh goes on to state that for youngsters after about age ten the difference in movement skill are as frequently due to variability in pubescence as to anything we may do as physical educators. In studies conducted by Klissouras (1971, 1972) the genetic factors appear to be primary in motor capacity. Perhaps this indicates that many of us "spin our wheels" in our teaching. Added to this is the recent appreciation, if not acceptance, of the role culture has played in male and female roles, and for various ethnic groups in relation to movement.

What does all this imply? We should clearly understand that we cannot identify all of the variables that are involved in programs of exercise, much less try to assess cause and effect relationships. Statistical analysis is not capable of providing answers that are more than tentative when it comes to most activities of the human organism. Yet careful research efforts, careful evaluation procedures, are much better than intuition which is the guide for most programs of physical education. A "gestalt" may be a beautiful concept for the psychologist, but it is thought to be unacceptable for the researcher and unforgivable for a teacher. If the total is not the sum of its' parts what rule is there for a trained professional? A shaman is what would be necessary.

Whenever we wish to evaluate we must be careful that we define what it is we are placing value on. Too often we try to measure effects of activity that have not been planned for, with inappropriate methadology. Let me categorically state that only a fool thinks that he or she can achieve improvement in any aspect of motor performance

through osmosis. By that I mean that teaching something frequently generalized as "movement skills" or "sports skills", and hoping that physical fitness, basic motor and/or lifetime recreational skills will accrue is akin to "walking on water". It has been ascribed to a few, but no one in physical education. The goal does not have to be obvious from the strategies employed, but the desired outcome must be specific, carefully planned for, and achieved with wisdom, dedication, and dispatch. To plan this goal, determine the procedures to reach the goal, to involve others in the planned process and to see if the goal was achieved is the evaluative process.

Evaluation in education implies testing. Unfortunately, testing has undesirable connotations to many people. It is believed that the "bad name" evaluation, tests and measurements have, is in part due to a misunderstanding as to how they should be applied to a teaching situation. Too often the first step, identifying the goal is not done in objective, behavioral terms. Today, even the books on educational evaluation have watered this concept down so that the initial, precise, easily understood idea has become highly subjective. If the goal is not exactly measurable, the only alternative is faith. Many teachers operate on faith! After identifying the exact behaviors you wish students to learn, the second step, instruction, is engaged in. This instruction should include opportunities to learn how to perform the exact behaviors that are the goals determined. The third step is to see if the exact behaviors can be performed in the appropriate situations. This is the testing that is done, but often times without the preliminary opportunity to learn just what was needed to do the test. In evaluation it is usually assumed that the behavior

being studied is truly representative of the individual. This necessitates the chance to learn how to do the test.

If there is a need to know what has been learned over a time period an initial test given at the beginning of the instructional period can be compared with a similar test given at another time period. If these tests are designed to help the student and the teacher understand how much has been learned, what are the strong and weak phases of the ultimate goal, and they are frequently given, the process is called formulative evaluation. If the purpose is only to see if the goal has been reached at the end of a designated period it is called summative. As with all evaluations, the terms are not important, but the purpose and use of the information obtained is. Learning is time dependent and not everyone learns at the same speed. This is true for motor skills and for the effects of exercise to be noted as well as for intellectual abilities.

Many of you were teaching when the Kraus-Weber fitness test results suggested that American children were inferior to those of other nations. After about three days of practice the typical elementary school student in the United States could pass that test successfully, thus doing as well as children from other countries. Many teachers "wisely" practiced the skills before testing and could report that "their" students were "fit" and that this was a result of their "superior" program when actually it only meant that the children had learned how to take the tests. Astrand and Rohdahl (]970) clearly point this fact out.

Going back to a point I made earlier, that is by including an initial test, a standard is provided against which a comparison can

be made. Please note that a series of measurements that have been made over a period of time does not insure that any positive change has been a result of the intervening period. To determine whether the planned program produced the desired effects requires a control group which takes all of the same tests but does not engage in the specific strategies included in an experimental program. This is basic research design, but often not done and perhaps not always needed by clinicians. Foolishly, we sometimes find clinicians and practitioners stating that they have found--if not the answer, at least an answer--when research is non-existent. One example that most of you are familiar with that has been classic in doing this but with sufficient flair to get many using a concept that was untested for many years was Kephart.

When the effects of exercise upon young children are carefully reviewed there are few revelations. On the basis of "best" evidence the generalization may be made that exercise produces the same kinds of results on children that it does with adults, but some differences have been noted. (Eriksson and Saltin, 1972).

Fabricius (1964) found that a three minute and nine second program of calisthenics added to a one minute and forty-eight second "normal exercise" program given four days per week over a semester produced significant differences on the score of the Oregon Fitness Test for fourth grade students. Bar-Or and Zwiren (1973) studied a similar type program over just nine weeks but altered the number of times per week the students engaged in the program; activity was given 2, 3, or 4 times per week. A comparison was also made between a "game" curriculum plus the calisthenics and an "endurance" curriculum

plus the calisthenics. No significant differences were found between the groups, the frequency, or the type of program except for a lowered heart rate at standardized work loads for the boys only. The results were interpreted to suggest that an improvement in cardiac response to exercise occured without an overall improvement in the oxygen transport system. A plausible reason for such variation in research findings may lie in the concept that there are probably growth periods of optimal development (Ekblom, 1971). The ethnic and cultural differences of the subjects in the two studies, American and Israeli children, may yield different growth periods, or it may be that the time differential to learn the skills and/or produce the physiological changes measured may account for the differences. As long as we do not know the actual reason for this kind of conflicting information, you and I need to look at our own programs carefully to be sure that we are effecting the kind of changes in students we actually desire and not just what we think we are doing.

Rohmert (1968) noted that a six second isometric contraction engaged in once a day improved the isometric strength of eight year-old boys and girls. No comparable isotonic or isokinetic strength studies of preadolescents have been found in the literature even though they are more applicable to physical education activities. Clarke (1971) used isometric measures on a group of students for a cross-sectional and longitudinal study (12 years). He found that strength tended to be age related in the sample investigated. The trend to retain the same relative position in a group during this growth period suggests that either little strength training occured in the school system that Clarke considered examplary or that most people progress at the same rate or that strength training does not produce much variation that cannot be accounted for ouside of

maturation. Logic and personal observation would indicate the first reason but we do not really know. Sheldon (1954) said that our somatotypes, determined genetically, predestine our physiological and psychological pathways throughout life.

Studies of endurance are confusing when we try to apply them to the needs of teachers. The studies by Adams (1961) of young children living in Southern California were found to be similar in Physical Working Capacity to those noted by Astrand (1952) of young Swedish children. These investigations are considered primary studies and the standards for performance of youth in many countries are based upon them. Care must be used wtih these studies and the resulting standards because the subjects were not representative. I challange you to use the I.Q. score of an Einstein as a standard for cognative abilities without ridicule or the motor performance scores of a James Brown. You will remember that he was an All-American high school athlete in different sports and then in another in college. Young Swedish children and those from Southern California (those used by Astrand and Adams) usually surpass the mean on physical performance measures that are not strictly cultural. Speed, balance, and flexibility have similar but their own inherent problems that must be considered in evaluation.

So what should we do? Is it truly as hopeless as I make it seem? The answer is obviously no! Yet, without taking adequate care the evaluation of the effects of exercise is in the realm of hope and faith. Advance planning is the key to a satisfactory evaluation program. What it is that you want to measure must be carefully defined so that valid, reliable, and objective measures may be taken. Pre-testing after making sure that the procedure and basic skills of every test are learned provides a criterion measure. A well designed activity program that includes

time for formative evaluation to take place is necessary to continue motivation and by implication, improvement, as a result of superior teaching. Thus, when the final, summative, test is attempted the students will look forward to the chance to show their ability rather than show fear at the opportunity to display poor responses.

If it is necessary or desirable to make comparisons with other groups, and if you are doing a good job teaching it is rewarding to see your students enthusiastically recognize their abilities by noting that they are performing above the average on standardized tests, it is a simple task to find an instrument that purports to measure whatever facet you have decided upon as your goal. Darrell Huff's monograph, How to Lie with Statistics, could just as easily be changed to read "How to Show Improvement in Motor Activities When There May Not be Any." If you properly prepare your students for a test they should show superior abilities over those who are not properly prepared. Most teachers do not properly prepare students for any evaluation.

If you select an instrument and continue to use the same test for a number of years you will be able to determine just how well any group does in comparison with others that are logically comparable. The International Biological Program developed a series of tests that were designed to be simple to use and to be relatively culture free (Weiner and Lourie, 1969; Biesheuvel, 1969). I think we should consider using these instruments more often than we have in the past. The AAHPER Fitness Test is the most frequently used test of physical performance in this country and it may be fine for some comparisons but it is not a superior measure.

To realize the potential of evaluation to determine the effects of exercise, or anything else, involves considerable effort on the part of

the teacher, particularly in terms of planning before the actual need to evaluate begins. It is not difficult. It is time consuming and above all, it is necessary!

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